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# Markham Centre 407 Transitway Alignment Review

Development Service Committee October 25, 2011



# Background

- Ministry of Transportation (MTO) 407 Transitway EA study completed in December 2010.
- Markham Council requested the MTO and Ministry of the Environment (MOE) revise the 407 alignment in the Langstaff/Richmond Hill Centre and Markham Centre.
- EA document was revised to include the following wording:

- It is important to emphasize that the preferred transitway alignment and station locations were selected based on designated Urban Growth Centres (UGC's) identified in the Growth Plan, approved extra space municipal land use plans, and the location of existing and approved transit facilities including GO Transit Rail, Subway and YRT/Viva corridors. MTO recognizes that there are ongoing studies within this section of the transitway including Richmond Hill-Langstaff Gateway and Markham Centre. Should significant changes to land use plans and planned transit alignments be agreed to in the future by all parties, MTO will modify the 407 Transitway Environmental Project Report (EPR) as required.

- ... the current Markham Centre precinct plan, which contains the Remington property, is being conceptually re-evaluated by the Town. Following completion and assessment of the future development plans on either side of the GO tracks in the precinct plan, it will be determined whether the 407 Transitway alignment and station location in this area, as presented in this EPR, should be revised and an Addendum to the Report filed.



# Background

- MOE approval of the Transitway EA was received on February 28, 2011
- At an April 12, 2011 meeting with Mayor Frank Scarpitti, Transportation Chair Gord Landon and Senior Staff from Metrolinx, MTO, GO Transit, VIVA and Markham, it was agreed Markham would advance the functional design of the Markham Centre Mobility Hub.
- Markham Council endorsed the land use and road layout concept prepared by Adamson in June 2011
- Due to pending development applications in the Markham Centre area, Markham advanced the technical review of the 407 transitway alignment options.
- Staff retained McCormick Rankin Corporation to undertake the review and evaluation of 3 alignment options.
- The options, evaluation and recommend alignment were submitted to the transit agencies (Metrolinx, MTO, VIVA, Region) and the technical working group met on October 19, 2011 to review.



# MTO Evaluation criteria from 407 Transitway EA have been utilized and enhanced

Objective	Goals
Improve Mobility	<ul> <li>Attractive, convenient system for passengers</li> <li>Maximize Ride Quality</li> <li>Minimize travel time</li> <li>Effect on transit reliability</li> <li>Improve integration with existing and planned transportation network</li> </ul>
Minimize Effects on Social Environment	<ul> <li>Minimize road disruption during construction</li> <li>Minimize rail disruption during construction</li> <li>Avoid physical and visual intrusion into sensitive areas</li> <li>Minimize increase in ambient noise levels</li> <li>Avoid physical intrusion into developable areas</li> <li>Increase support for a more compact urban form</li> <li>Minimize future construction impacts</li> </ul>
Minimize Effects on Natural Environment	<ul> <li>Avoid intrusion into terrestrial habitat</li> <li>Minimize effects on watercourses</li> </ul>
Cost Effective	<ul> <li>High quality functionality at least capital cost</li> <li>Long term durability and hence least maintenance cost</li> <li>Efficient, affordable transit operations</li> </ul>

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# MTO 407 Transitway EA Alignment



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# MTO 407 Transitway EA Alignment

- Provides the most compact transit interchange between various modes of transit
- Impacts the most number of development blocks within Markham Centre (7)
- Future implementation of the transitway will require construction under proposed buildings / roadways, may require advanced construction for development to occur
- High capital construction cost (\$210 \$325M)



# **Markham Live Transitway Alignment**



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# **Markham Live Transitway Alignment**

- Provides good transit interchange between various modes of transit
- Similar to MTO EA alignment with fewer development blocks impacted, impacts three development blocks within Markham Centre
- Future implementation of the transitway will require construction under proposed buildings / roadways, may require advanced construction for development to occur
- High capital construction cost (\$195 \$310M)



# **Frontage Street Transitway Alignment**



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# **Frontage Street Transitway Alignment**

- Requires 290 metres of transfer distance between bus transfers, other options have less than 20 metres of transfer distance
- Impacts no development blocks within
   Markham Centre
- Future implementation of the transitway does not require construction under proposed buildings / roadways
- Low capital construction cost (\$95 \$125M)



OBJECTIVE			ALIGNMENT ALTERNATIVES			
(and relative weighting)	GOALS	INDICATORS	Hwy 407 EA Alignment between Birchmount and Kennedy	Markham Live Street Alignment	Frontage Street South Alignment OVERPASS	
Improve Mobility	Attractive, convenient system access for passengers	Length/Height of vertical circulation elements to reach connecting system platforms. Interface with GO and VIVA primary entrance.	Underground station requires multi- level passenger transfers. 50m horizontal and 20m vertical between Viva and Transitway, 65m horizontal and 10m vertical to GO Rail platform.	Underground station requires multi- level passenger transfers. 110m horizontal and 20m vertical between Viva and Transitway, 0m horizontal and 10m vertical to GO Rail platform	Transitway at grade with future road grade allows for easy on-street passenger access. Longest transfer distance between Transitway and Viva / YRT. 290m horizontal and 20m vertical between Viva and Transitway, 0m horizontal and 10m vertical to GO Rail platform	
	Maximize ride quality and passenger comfort	Transitway geometry and grading through grade separation and station	Horizontal alignment of Transitway on a sharp horizontal curve approaching proposed Kennedy Station. 250 metre radius - 168m long and a 125 metre radius - 96m long. 4% and 3.85% grades approaching and exiting the tunnel.	Horizontal alignment of Transitway on a sharp horizontal curve approaching proposed Kennedy Station. 250 metre radius - 168m long and a 125 metre radius – 79m long. 4% and 3.85% grades approaching and exiting the tunnel	Linear horizontal grade through station allows for a simplified design. Flat vertical grade from continuous overhead alignment. 500 metre radius – 55m long, 300 metre radius – 209m long, 200 metre radius – 200m long 0% - 0.3% grades through Markham Centre	
	Minimize travel time to access Kennedy Station	Estimated run time through Kennedy alignment off of 407 ROW	This is the longest alignment through Markham Centre, 1370 metres from match point to match point.	Alignment is marginally shorter than the 407 EA alignment, 1340 metres from match point to match point (approximately 2 seconds of travel time savings)	Shortest Transitway distance through Markham Centre, 1305 metres from match point to match point (approximately 4.5 seconds of travel time savings)	
	Effect of infrastructure configuration on transit reliability	Potential for delays and incidents affecting adherence to service schedule and overall reliability	Enclosed Tunnel portion exposed to minimal external delay-causing factors.	Enclosed Tunnel portion exposed to minimal external delay-causing factors.	Above ground Transitway susceptible to weather related delays	
	Improve integration with existing and planned regional transportation network	Transfer distance between transitway route and other transit systems and other travel modes	Closest to Viva / YRT Transit Station, 50m adjacent to GO Station platforms, 65m.	Close to Viva / YRT Transit Station 110m, directly below GO Station platforms, 0m.	Furthest from Viva / YRT Transit Station, 290m. Directly below south end of GO Station platforms, 0m.	
40%						

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OBJECTIVE	GOALS	INDICATORS	ALIGNMENT ALTERNATIVES			
(and weighting)			Hwy 407 EA Alignment between Birchmount and Kennedy	Markham Live Street Alignment	Frontage Street South Alignment OVERPASS	
Minimize adverse effects on social environment and Markham Centre growth potential	Minimize road traffic disruption during t construction	Nature and complexity of short term, temporary traffic accommodation measures required	Requires tunnelling through Markham Centre and under Kennedy Road. Crossing of 7 roads within Markham Centre. If tunnel boring machines are used, traffic disruption would be minimized.	Requires tunnelling through Markham Centre and under Kennedy Road. Crossing 2 roads and 650 metres under Markham Live Street. If tunnel boring machines are used, traffic disruption would be minimized. The construction of the transitway station will cause traffic disruption which can be mimized through staging and temporary decking over the excavated area.	Construction may cause some minor disruptions to Frontage Road. Overpass construction at Kennedy and associated 407 ramps requires staging but minimal traffic disruption.	
	Minimize rail traffic disruption during construction	Nature, complexity and duration of temporary rail traffic accommodation measures required	Construction below railway may require rail diversion, if tunnel boring machines are used, rail disruption would be minimized.	Construction below railway may require rail diversion, if tunnel boring machines are used, rail disruption would be minimized.	Construction above railway will require coordination with GO, 7.4m of vertical clearance to be provided for future electrification.	
	Avoid physical and visual intrusion in sensitive areas	Extent of visual intrusion by completed transitway works	At or below grade transitway works will not affect any views. Elevated segment of transitway over highway 407 is common for all alternatives.	At or below grade transitway works will not affect any views. Elevated segment of transitway over highway 407 is common for all alternatives.	At grade transitway works will not affect any views. Elevated segment of transitway over Kennedy Road is adjacent to existing interchange and the crossing of highway 407 is common for all alternatives.	
	Minimize increase in ambient noise levels	Potential for noise intrusion in adjacent sensitive areas	Tunnelled alignment mitigates Transitway ambient noise levels.	Tunnelled alignment mitigates Transitway ambient noise levels.	Above ground Transitway may require noise mitigation.	
	Avoid physical intrusion into developable areas	Length of transitway ROW under or over land available for TOD	Approximately 700m of Tunnel under proposed developable areas, impacts 7 development blocks.	Approximately 175m of Tunnel under proposed developable areas, impacts 3 development blocks.	Approximately 1 km surface route adjacent to proposed roadway, 1 development block east of Kennedy Road is impacted.	

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OBJECTIVE	GOALS	INDICATORS	ALIGNMENT ALTERNATIVES			
(and relative weighting)			Hwy 407 EA Alignment between Birchmount and Kennedy	Markham Live Street Alignment	Frontage Street South Alignment OVERPASS	
	Increase support for a more compact urban form	Conformity with the goals, objectives and policies of provincial and municipal official plans	Supports a more compact urban form.	Supports a more compact urban form.	Supports a more compact urban form.	
	Minimize future construction impacts	Ability to implement the Transitway with minimal impact to the surrounding area (roads and buildings)	Will require construction under developed lands (700m) and construction 17 metres deep under proposed roadways, requiring prebuild under buildings and the use of TBM's. Preplanning is required to ensure the proposed development does	Will require construction through developed lands (175m) and construction 17metres deep under Markham Live Street requiring prebuild under buildings and the use of TBM's. Preplanning is required to ensure the proposed development does not impact the proposed transitway. Additional building foundations, settlement monitoring and grouting may be	Construction can take place adjacent to Frontage Road at or near the same elevation, minimal future impacts.	
			not impact the proposed transitway. Additional building foundations, settlement monitoring and grouting may be required.	required.		
30%				0		

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OBJECTIVE		INDICATORS	ALIGNMENT ALTERNATIVES			
(and relative weighting)	GOALS		Hwy 407 EA Alignment between Birchmount and Kennedy	Markham Live Street Alignment	Frontage Street South Alignment OVERPASS	
Minimize adverse effects on natural environment	Avoid intrusion into terrestrial habitat	Extent of intrusion and proximity to sensitive terrestrial habitat	No significant impact to natural environment.	No significant impact to natural environment.	No significant impact to natural environment.	
	Minimize effects on watercourses	Potential for adverse effects on aquatic habitat	No significant impact to watercourses, transitway crosses over Markham Centre tributary and tributary 5 to be maintained.	No significant impact to watercourses, transitway crosses over Markham Centre tributary and tributary 5 to be maintained.	No significant impact to watercourses, transitway crosses over Markham Centre tributary and tributary 5 to be maintained.	
10%						
Offer a cost- effective way of moving people	High quality functionality at least capital cost	Relative order-of- magnitude construction costs	\$210 - \$324.5 million	\$195 – \$310 million	\$95 - \$125 million	
	Long term durability and hence least maintenance costs	Nature of infrastructure maintenance and effect on annual maintenance cost	Increased maintenance of Tunnel and Underground Station, 1000m of below ground infrastructure.	Increased maintenance of Tunnel and Underground Station, 980m of below grade infrastructure.	Additional snow clearing required with this option, significantly reduced long term structure maintenance due to elimination of underground tunnel and station.	
	Efficient, affordable transit operations	Effect of infrastructure configuration on transit operating costs	Minor increase in energy consumption due to steeper transitway profile grades	Minor increase in energy consumption due to steeper transitway profile grades	Lowest energy consumption due to lower profile grades.	
20%						
OVERALL RESPONSIVENESS (after weighting)		Č	Č			
LEGEND: Overall Achievement of Objectives: Poor () () () () ()		Very Good				

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Objective	Alignment Alternatives			
	MTO EA	Markham Live Street	Frontage Street - Elevated	
Improve Mobility	$\bigcirc$	$\bigcirc$		
Minimize Effects on Social Environment				
Minimize Effects on Natural Environment				
Cost Effective				
OVERALL	G	G		



# **Summary of Key Issues between Options**

- Frontage Street option
  - o introduces a ~300m transfer distance for bus / bus passengers
  - $\circ$  the transitway station is not centred within Markham Centre
  - o impacts no development blocks
  - o has the lowest capital cost
- Markham Live option
  - o minimal transfer distance for bus / bus passengers
  - o transitway station is centered within Markham Centre
  - impacts three development blocks, may require advance construction and coordination with development
  - o high capital cost
- 407 EA option
  - o minimal transfer distance for bus / bus passengers
  - o transitway station is centered within Markham Centre
  - impacts seven development blocks, may require advance construction and coordination with development
  - high capital cost

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# **Next Steps**

- Technical working group to meet further to try and reach consensus on the recommended alignment.
- Executive Committee consisting of senior staff from Metrolinx, MTO, ROY, VIVA and Markham meet to address any outstanding issues from the transit agencies.
- Staff to report back with a report and recommended 407 transitway alignment in Markham Centre in late early December 2011 / January 2012.

